IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of	
Christian L. Marquez	Art Unit: 2862
Patent Application No.: 10/027,941	Examiner: Gerard Strecker
Filed: December 19, 2001	
For: COAXIAL LASER WELD THROUGH LID RF PLANARIZING PHOTONICS PACKAGE	

RESPONSE

Commissioner for Patents
PO Box 1450
Alexandria, VA 22313-1450

Sir:

The following amendments and remarks are submitted in response to the Office Action of November 24, 2003 in the above-identified patent application.

AMENDMENTS

IN THE DETAILED DESCRIPTION

Please amend the specification as follows by canceling the appropriate paragraphs and inserting the following substitute paragraphs:

[0009] After the optical fiber has been positioned, the ferrule surrounding the fiber is secured to the coaxial flange, as by a ring weld, hermetically sealing the joint between the flange and the ferrule. Thereafter, the flange is secured [[in]] over the fiber alignment window [[by a]] via welding. A relatively slow-setting sealant, such as solder, ~~and while~~ can be used to provide a hermetic seal. While the sealant is setting, and is still fluid, the fiber is realigned, as needed, by the adjustable holding mechanism. As the sealant sets, the fiber is reliably and accurately aligned with the photodetector by this process, assuring maximum light signal coupling. Finally, the closure for the viewing aperture is sealed in place, to complete the improved, hermetically sealed photonics package in accordance with the present invention.

[0014] Turning now to a more detailed description of the present invention, there is illustrated in perspective view Figs. 1 and 2 and in cross-section in Figs. 3 and 4 photonics package 10 constructed in accordance with the present invention. The package consists of a housing 12 having a rear wall 14, a front wall 16, a top wall 18, sidewalls 20 and 22, and a bottom wall 24. Secured to the front wall 16 is a first closure~~, or lid~~ 26 which cover an aperture 28 (see Fig. 3) in the front wall, with the [[lid]] first closure 26 incorporating a ~~second aperture 30 which serves as~~ a fiber alignment window 30 for receiving and securing an optical fiber assembly generally indicated at 32.

[0015] The top wall 18 includes a viewing aperture 34 which is closed by a second closure~~, or lid,~~ 36, the viewing aperture being located to permit access to the interior of the housing during assembly of the photonic package.

[0016] Mounted on the interior surface 40 of rear wall 14 is an MMIC chip 42 which may be mounted on a chip carrier, or platform, 44 in a known manner, with the platform 44 being secured to rear wall surface 40, also in known manner. The chip 42, which includes a photodetector, is mounted and positioned on the rear wall 14 so that the photosensitive surface of the detector is in general alignment with the center of ~~aperture~~ fiber alignment window 30 formed in [[lid]] first closure 26, when the [[lid]] first closure is in place over aperture 28. This general alignment serves to position the photodetector of chip 42 in general axial alignment with an optical fiber (to be described) included as a part of assembly 32. The MMIC photodetector chip 42 also may include other circuitry; for example, it may incorporate a radio frequency (RF) amplifier having its input connected to the photodetector and having its output connected through wall 14 to high frequency connector 26, in conventional manner. In addition, the rear wall 14 may also carry a connector pin 48 for supplying a DC bias voltage to the package 10 for operation of the integrated circuits on chip 42, again in known manner. The package 10 is hermetically sealed, and preferably includes suitable mounting devices such as mounting tabs 50 and 52.

[0019] The ferrule and the enclosed optical fiber are next positioned in an elongated, generally cylindrical flange 80, with an inner diameter 86 of the flange being slightly larger than the outer diameter of the ferrule 64 to permit easy insertion of the ferrule and to allow it to be properly positioned longitudinally within the flange, the optical fiber assembly 32. The flange is then positioned on the outer surface 82 of [[lid]] first closure 26 in general alignment with ~~aperture~~ fiber alignment window 30 and ~~center line~~ axis 62, with the ferrule extending through the flange into the window 30, as illustrated in Fig. 4. Preferably, the diameter of window 30 is greater than the diameter of the ferrule 64 to allow the optical fiber assembly 32 to move laterally in the window, with the relative diameters of the ferrule and the window limiting that motion.

[0020] The flange 80 preferably includes an enlarged base 84 which contacts the surface 82 of first closure 26 and is sufficiently large to ensure that the ~~aperture~~ fiber alignment window 30 remains covered by the flange 80 while the optical fiber assembly 32 is moved laterally within the ~~aperture~~ fiber alignment window 30 to permit a rough alignment of the assembly 32 with the photodetector 42. The flange can then be secured to the surface 82 of [[lid]] first closure 26, for example by a conventional laser fillet weld. ~~However, in~~ In accordance with a preferred form of the invention, a circumferential groove 88 surrounds the peripheral edge of ~~aperture~~ fiber alignment window 30 and is closely spaced thereto, with the groove containing a slow-setting or slow-curing sealing material 90 which preferably is a material such as solder, and which is activated to ~~secure~~ hermetically seal flange 80 to the [[lid]] first closure 26, as will be described.

[0022] When the end 72 of the fiber 68 is spaced apart from the surface of the photodetector 42 by the desired amount, the ferrule 64 is spot welded and then ring welded to the upper end of the flange 80, as illustrated at 100 in Fig. 4, to produce a hermetic seal between the ferrule and the interior of the flange 80. The fiber optic assembly 32 is then laterally aligned with the photodetector 42, and the base 84 of the flange 80 is ~~secured~~ hermetically sealed to the surface 82 of the [[lid]] first closure 26 by heating the solder 90 in groove 88 by hot gas injection or laser soldering, in accordance with the preferred form of the invention. In this process, a non-eutectic solder such as Sn or SnAg (93/7), having a liquid temperature which is far higher than its solid temperature, is heated to is liquid temperature and then allowed to cool. As the solder cools, the optical fiber assembly 32 is realigned as necessary, by using the tweezer 96, to shift it laterally for example, so as to maintain a maximum light signal coupling between the optical fiber and the ~~photodiode~~ photodetector. The solidified solder secures the optical fiber assembly 32 in place and hermetically seals the fiber ~~adjustment~~ alignment window 30. Finally, the second closure 36 is laser welded to the housing wall 18, as indicated at 102 in Fig. 4, completing the hermetic

sealing of the housing to provide a sealed photonic package.